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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/806,610	03/23/2004	Toshimitsu Taniguchi	10417-039002 / F51-125462	2451
26211	7590	06/02/2005	EXAMINER	
FISH & RICHARDSON P.C. CITIGROUP CENTER 52ND FLOOR 153 EAST 53RD STREET NEW YORK, NY 10022-4611			GEBREMARIAM, SAMUEL A	
			ART UNIT	PAPER NUMBER
			2811	

DATE MAILED: 06/02/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No.	Applicant(s)	
	10/806,610	TANIGUCHI ET AL.	
	Examiner	Art Unit	
	Samuel A. Gebremariam	2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-5 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 June 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☒ Certified copies of the priority documents have been received in Application No. 09/652,044.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>3/23/04</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Drawings

1. Applicant is required to submit a proposed drawing correction in reply to this Office action. However, formal correction of the noted defect can be deferred until the application is allowed by the examiner.
2. Figure 14 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g).
3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: Reference numerals 51 denoting the substrate, N-type well 52 and P-type body layer are not shown in fig. 12. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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5. Claims 2 and 3 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Dependent claims 2 and 3 claim the limitation of a gate electrode, a high concentration source and drain layers and a body layer. It is not clear whether the claims are referring to the same gate electrode, high concentration source/drain layer or body layer as in claim 1.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Kubo, US patent No. 5,567,629.

Regarding claim 1, Kubo teaches (figs. 2A and 2B) a semiconductor device provided with high concentration source/drain layers (4 and 5) of the reverse conductive (conductivity type of the source/drain region is different than the substrate) type formed in a semiconductor layer (1b) of one conductive type (p), a gate electrode (3) formed on a channel layer located between the source and drain layers (refer to figs. 2A and 2B), a body layer (1C) of one conductive type formed in the vicinity of the source layer (4) and a low concentration drain layer (the low concentration drain region, refer to fig. 2B) of the reverse conductive type (conductivity type of the source region and low concentration drain region is different than the body region) formed between the

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channel layer and the drain layer(refer to fig. 2B), wherein: the body layer (1C) is formed only under the gate electrode (3).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 2-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kubo in view of Chen et al., US patent No. 5,926,712.

Regarding claim 2, Kubo teaches substantially the entire claimed structure of claim 1 above including a gate electrode (3) formed on a semiconductor layer (1b) of one conductive type via a gate oxide film (2); a high concentration source layer (4) of the reverse conductive type formed so that it is adjacent to one end of the gate electrode (3); a high concentration drain layer (5) of the reverse conductive type formed apart from the other end of the gate electrode (3); a low concentration drain layer (N region under gate) of the reverse conductive type extended from under the gate electrode (3) and formed so that said low concentration drain layer of the reverse conductive and a body layer (1C) of one conductive type under the gate electrode (3) formed between the source layer (4) of the reverse conductive type and the drain layer (5) of the reverse conductive type.

Kubo does not teach that the low concentration drain layer of the reverse conductive type surrounds the drain layer of the reverse conductive type.

Chen teaches (fig. 2f) a structure where a low concentration drain layer (216) of reverse conductive type is formed to surround a drain layer (219) of the reverse conductive type in method of fabricating a MOS device.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the low concentration drain layer of reverse conductive type to surround the drain layer of the reverse conductive type of Kubo's structure as suggested by Chen in order to form a MOS device that is immune from the drop of threshold voltage.

Regarding claim 3, Kubo teaches substantially the entire claimed structure of claim 1 above including a gate electrode (3) formed on a semiconductor layer (1b) of one conductive type via a gate oxide film (2); high concentration source/drain layers (4 and 5) of the reverse conductive type formed apart from the gate electrode (3); and a low concentration source/drain layers (N region adjacent the source/drain regions) of the reverse conductive type formed; and a body layer (1C) of one conductive type formed under the gate electrode.

Kubo does not explicitly teach that the low concentration source/drain layers of the reverse conductive type are formed so that they respectively surround the source /drain layers of the reverse conductive type.

Chen teaches (fig. 2f) forming low concentration source/drain layers (216) of the reverse conductive type formed so that they respectively surround the source /drain layers (219) of the reverse conductive type.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the low concentration layer of reverse conductive type to surround the source/drain layers of the reverse conductive type of Kubo's structure as suggested by Chen in order to form a MOS device that is immune from the drop of the threshold voltage.

Regarding claim 4, the combined structure of Chen and Kubo teaches substantially the entire claimed structure of claim 1 above including the low concentration source/drain layers of the reverse conductive type are formed so that they are shallow under the gate electrode (Chen 215) and are deep under the high concentration source/drain layers of the reverse conductive type (refer to fig. 2f of Chen).

10. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kubo in view of Soderbarg et al., US patent No. 5,844,272.

Kubo teaches substantially the entire claimed structure of claim 1 above except explicitly stating a reverse conductive type layer is formed in a surface portion of the body layer.

Soderbarg teaches forming a (n-) region on the side surface of a p-body region (22) in a structure of high voltage device.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the reverse conductive type layer formed in the side surface portion of the body layer as taught by Soderbarg in the structure of Kubo in order to form an n-channel transistor.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. References A and B are cited as being related to MOS transistor. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Samuel A Gebremariam whose telephone number is (571) 272-1653. The examiner can normally be reached on 8:00am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on (571) 272-1732. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SAG
May 23, 2005



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